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Myriopteris windhamii sp. nov., a New Name For *Cheilanthes villosa* (Pteridaceae)

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Abstract.—Recent studies examining the evolutionary relationships of species assigned to *Cheilanthes* (Pteridaceae) reveal that the genus is highly polyphyletic. To achieve a monophyletic generic classification of the 400+ taxa of cheilanthoid ferns, it is necessary to transfer species that are only distantly related to the type species (*Cheilanthes micropteris*) to other genera. One of these species is *Cheilanthes villosa* Davenp. ex Maxon, which needs to be reassigned to the genus *Myriopteris*. Because the epithet *villosa* is preoccupied in *Myriopteris* and there are no synonyms for this distinctive taxon, a new name is required. The species is herein renamed *Myriopteris windhamii*.

Key Words.—apomixis, cheilanthoid, myriopterid, triploid

Recent molecular systematic studies of cheilanthoid ferns (Pteridaceae) have confirmed that the globally distributed genus *Cheilanthes* Sw. is highly polyphyletic (Eiserhardt *et al.* 2011; Gastony and Rollo 1998; Li *et al.* 2012; Link-Perez *et al.* 2011; Prado *et al.* 2007; Rothfels *et al.* 2008; Schuettpelz *et al.* 2007; Windham *et al.* 2009; Zhang *et al.* 2007). Species currently assigned to *Cheilanthes* occur in five of the six major cheilanthoid clades identified by Windham *et al.* (2009) and Eiserhardt *et al.* (2011). To achieve a monophyletic generic classification of the 400+ taxa of cheilanthoid ferns that includes more than a single genus, it is necessary to transfer to other genera those species that are only distantly related to the South American generitype, *Cheilanthes micropteris* Sw. A series of recent papers (e.g., Li *et al.* 2012; Perez-Link *et al.* 2011; Yatskievych and Arbeláez 2008) have initiated this process of narrowing and refining the circumscription of *Cheilanthes*. Continuing this effort, we are preparing to resurrect the genus *Myriopteris* Fée (Grusz *et al.* in prep), which, in its emended form, will include most of the North American taxa currently residing in *Cheilanthes*.

The clade that will become *Myriopteris* Fée *emend* Grusz & Windham is a well supported monophyletic group that comprises roughly 10% of cheilanthoid species diversity. It is among the earliest diverging lineages of cheilanthoid ferns and only distantly related to the type species of *Cheilanthes*. Most of the 40+ species in this group are easily transferred from *Cheilanthes* to *Myriopteris*, the most obvious exception being *Cheilanthes villosa* Davenp. ex Maxon. The name *Myriopteris villosa* was previously published by Fée (1852) based on a collection now associated with *Cheilanthes lendigera* (Cav.) Sw. (= *Myriopteris lendigera* (Cav.) Fée). Because the epithet *villosa* is thus preoccupied in *Myriopteris* and there are no synonyms for the

distinctive taxon known as *Cheilanthes villosa*, a new name is required. This apomictic triploid species is here renamed *Myriopteris windhamii*.

Myriopteris windhamii Grusz, ***sp. nov.*** TYPE.—USA. Arizona: Cochise Co., SSW of Sierra Vista in the Huachuca Mts. along Copper Canyon, ca. 0.25 trail miles NE of its intersection with W Montezuma Canyon Road. Lat./Long/: 31.36385N 110.29794W (WGS84 Datum). Elevation 6175 feet. 16 August 2013, *Windham 4165* (holotype: DUKE; isotypes: ARIZ, ASC, ASU, GH, MO, NMC, NY, TEX/LL, UNM, US, UT). **Figs. 1–2.**

Cheilanthes villosa Davenp. ex Maxon, Proc. Biol. Soc. Wash. 31: 142. 1918; non *Myriopteris villosa* Fée

Rhizomes compact, scales linear-lanceolate, entire to slightly erose, 0.2–0.6 mm wide, often with a well defined, lustrous, dark central stripe and light brown margins, with tufted concolorous scales at rhizome apices and stipe bases, straight to slightly contorted, loosely appressed, persistent; *leaves* clustered, 7–30 cm long, with non-circinate vernation; *blades* narrowly oblong-lanceolate, 3–4-pinnate at the base; *petioles* dark reddish brown, lustrous, terete, with scattered, ascending, lanceolate scales, largely paleaceous, darker at point of attachment, mixed with abundant, hair-like scales; *rachises* with mostly hair-like scales adaxially and broader lanceolate to ovate scales abaxially, otherwise similar to petioles; *pinnae* 8–20 pairs, not articulate, with dark color of rachises continuing into pinna bases, basal pair usually slightly smaller than adjacent pair, equilateral, appearing villous above and scaly below; *costae* adaxial surface greenish except at base, with scattered hairs and hair-like scales, abaxial surface of costae dark and lustrous except at apex, with conspicuous ovate-lanceolate, truncate to shallowly cordate scales, these 0.7–1.2 mm wide, strongly imbricate, spreading laterally, with erose-dentate margins, not ciliate, brown proximally, paleaceous distally, attenuate to hair-like apices; *ultimate segments* round to elliptical, the largest 1–2 mm wide, with coarse, contorted, whitish or translucent hairs adaxially and occasional hairs and narrow scales abaxially; *leaf margins* recurved, forming a weakly differentiated marginal false indusium to 0.2 mm wide; *sporangia* attached near vein endings, becoming confluent at maturity, partially covered by false indusium; *spores* 32 per sporangium, 60.8 ± 2.47 μm in diameter; $n = 2n = 90II$ (apomictic; Windham and Yatskievych 2003).

Paratypes.—**U.S.A. Arizona:** Cochise Co., west wall of Copper Canyon in the Huachuca Mts. ca. 2.42 km NNW of the summit of Coronado Peak, Coronado National Forest, Montezuma Pass Quad (7 ½ min.), UTM - 3469960 m. N by 566775 m. E (Zone 12), elevation 6250 ft., 5 August 1983, *Windham 458*. Pima Co., Waterman Mts., N-facing slope on NE end of range, T12S R8E S24, pitted limestone with *Larrea, Cereus giganteus, Cercidium*, 3200 ft., *Bruce Parfitt 2786*, 24 Mar 1979 (NY); Cochise Co., Coronado National Forest, Huachuca Mts., east side of Copper Canyon at a point 3.04 km. NNW of the summit of Coronado Peak, Montezuma Pass Quadrangle (7 ½ min.), Universal Transverse

FIG. 1. Scanned image of the holotype of *Myriopteris windhamii* (*Windham 458*, DUKE). Scale bar in centimeters.

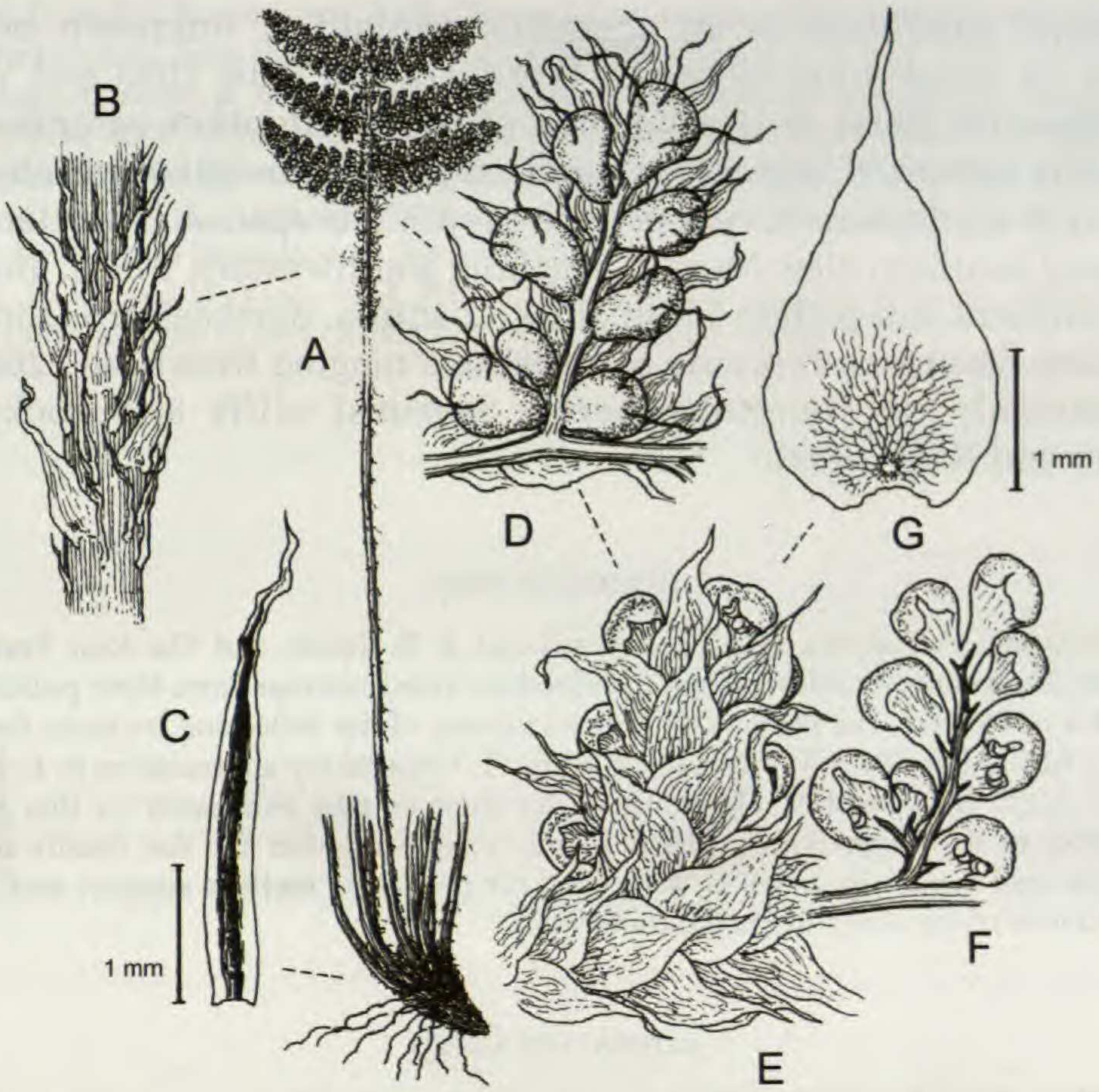

FIG. 2. *Myriopteris windhamii* (*Pringle 459*, NY). A. Rhizome and partial frond. B. Stipe detail. C. Rhizome scale. D. Pinnule, adaxial surface. E. Pinnule, abaxial surface. F. Pinnule, abaxial surface, with scales removed. G. Blade scale. Scale bars = 1 mm. Reproduced from *The Pteridophytes of Mexico* (Mickel and Smith, 2004) with permission of The New York Botanical Garden Press.

Mercator- 3470625m.N by 566650m.E (Zone 12), growing from crack under overhang on cliff face ca. 6 meters E. of streambed, about 25° facing west, locally common on limestone outcrops at lower elevations., associated genera *Quercus, Brickellia, Pinus, Garrya, Cercocarpus,* and *Juniperus, Windham 0236*, 17 March 1981 (UT, ASC). **New Mexico:** Eddy Co., Lincoln National Forest, along rd. 409 to Sitting Bull Falls, open NW facing (309°) limestone cliff with *Quercus, Dasylirion, Opuntia, Rhus, Gutierrezia*, N 32.2630, W 104.6807, 1356 m. *Beck 1050*, 02 May 2008 (NY, DUKE). **Texas:** El Paso Co., Tom Mays County Park, Franklin Mountain, northwest edge of El Paso, common under rocks in ravine on limestone hillside in Chihuahuan Desert, with *Notholaena, Cheilanthes, Pellaea, Agave, Yucca, Dasylirion, Quercus,* and grasses, elevation 4400 feet, *Wollenweber & Yatskievych 81-510*, 15 December 1981 (ARIZ).

Etymology.—This name honors Dr. Michael D. Windham, acknowledging his lifelong dedication to the study of cheilanthoid ferns and, in particular, his devotion to understanding the evolution and cytogenetics of apomictic polyploids (including his new namesake in *Myriopteris*).

Myriopteris windhamii is an apomictic triploid of unknown origin (see comments on *Cheilanthes villosa* by Windham and Rabe 1993 and Windham and Yatskievych 2003). It is a member of the *Cheilanthes eatonii* complex, along with *C. eatonii*, *C. tomentosa*, and *C. myriophylla*—all of which are being transferred to *Myriopteris* (Grusz *et al.* in prep.). The species is scattered across Arizona and southern New Mexico, reaching southwestern Texas, and, within Mexico, northern and eastern Chihuahua, Coahuila, northeastern Durango and northeastern Zacatecas. It occurs at elevations ranging from 400–2200 meters, most commonly on limestone (rarely igneous) cliffs and rocky slopes (Windham and Rabe 1993).

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